

CLAIMS

Please amend the presently pending claims as follows:

1. (Currently Amended) A method for transmitting a biorthogonal frequency division multiplex/offset modulation (BFDM/OM) biorthogonal multicarrier signal characterized in that it implements a transmultiplexer structure providing:

a modulation step, by ~~means of~~ a bank of synthesis filters, having $2M$ parallel branches, $M \geq 2$, each fed by source data and each comprising an expander of order M and filtering means; and

a demodulation step, by ~~means of~~ a bank of analysis filters, having $2M$ parallel branches, each comprising a decimator of order M and filtering means, and delivering representative data received from said source data,

said filtering means being derived from a predetermined prototype modulation function.

2. (Original) The transmission method according to claim 1, characterized in that said filtering means of said bank of synthesis filters and/or of said bank of analysis filters are grouped as a polyphase matrix, respectively.

3. (Previously Presented) The transmission method according to claim 2, characterized in that at least one of said polyphase matrices comprises a reverse Fourier transform with $2M$ inputs and $2M$ outputs.

4. (Previously Presented) The modulating method according to claim 12, characterized in that it implements a reverse Fourier transform fed by $2M$ source data, each having undergone a predetermined phase shift, and feeding $2M$ filtering modules, each followed by an expander of order M , the outputs of which are grouped then transmitted.

5. (Currently Amended) The modulation method according to claim 4, characterized in that it delivers data $s[k]$ such as:

$$\begin{aligned}
 x_m^n(n) &= a_{m,n} e^{j\frac{\pi}{2}n} \\
 x_l^1(n) &= \sqrt{2} \sum_{k=0}^{2M-1} x_k^0(n) e^{j\frac{2\pi}{2M}k\frac{D-M}{2}} e^{j\frac{2\pi}{2M}kl} \\
 &= 2M\sqrt{2}IFFT\left(x_0^0, \dots, x_{2M-1}^0(n) e^{-j\frac{2\pi}{2M}(2M-1)\frac{D-M}{2}}\right)[l] \\
 x_l^2(n) &= \sum_{k=0}^{m=l} p(l+2kM) x_k^l(n-2k) \\
 s[k] &= \sum_{n=\left\lfloor \frac{k}{M} \right\rfloor - 1}^{\left\lfloor \frac{k}{M} \right\rfloor} x_{k-nM}^2(n)
 \end{aligned}$$

wherein $D = \alpha M - \beta$,

with α an integer representing the reconstruction delay;

β an integer between 0 and $M-1$;

and $[.]$ is the "integral part" function.

6. (Previously Presented) The demodulating method according to claim 15, characterized in that it implements a reverse Fourier transform fed by $2M$ branches, themselves fed by said transmitted signal, and each comprising a decimator of order M followed by a filtering module, and feeding $2M$ phase shift multipliers, delivering an estimation of the source data.

7. (Currently Amended) The demodulation method according to claim 6, characterized in that it delivers data $\hat{a}_{m,n-\alpha}$ such that:

$$\hat{x}_l'^2(n-\alpha) = s[nM - \beta - l]$$

$$\hat{x}_l^{i1}(n-\alpha) = \sum_{k=0}^{m-1} p(l+2kM) \hat{x}_l^{i2}(n-\alpha-2k)$$

$$\begin{aligned} \hat{x}_l^{i0}(n-\alpha) &= \sqrt{2} e^{-j \frac{2\pi}{2M} l \frac{D+M}{2}} \sum_{k=0}^{2M-1} \hat{x}_l^{i1}(n-\alpha) e^{j \frac{2\pi}{2M} kl} \\ &= 2M \sqrt{2} e^{-j \frac{2\pi}{2M} l \frac{D+M}{2}} \text{IFFT}(\hat{x}_l^{i1}(n-\alpha), \dots, \hat{x}_{2M-1}^{i1}(n-\alpha)) [l] \end{aligned}$$

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$$\hat{a}_{m,n-\alpha} = \Re \left\{ e^{-j \frac{\pi}{2} (n-\alpha)} x_l^{i0}(n-\alpha) \right\}$$

with: $D = 2.s.M + d$,

wherein: s is an integer;

d is between 0 and $2M-1$.

8. (Previously Presented) The demodulation method according to claim 15, characterized in that said filtering modules are produced as one of the filters belonging to the group comprising:
transverse structure filters;
ladder structure filters; and
trellis structure filters.

9. (Currently Amended) The modulation method according to claim 15, characterized in that said biorthogonal multicarrier signal is a comprises an orthogonal frequency division multiplex/offset modulation (OFDM/OM) signal.

10. (Canceled).

11.(Currently Amended)The method according to claim 1, characterized in that said biorthogonal multicarrier signal is comprises an orthogonal frequency division multiplex/offset modulation (OFDM/OM) signal.

12.(Currently Amended)The A method for modulating a biorthogonal frequency division multiplex/offset modulation (BFDM/OM) biorthogonal multicarrier signal, characterized in that it implements a bank of synthesis filters having $2M$ parallel branches, $M \geq 2$, each fed by source data and each comprising an expander of order M and filtering means, said filtering means being derived from a predetermined prototype modulation function.

13. (Previously Presented)The modulation method according to claim 12, characterized in that said filtering modules are produced as one of the filters belonging to the group comprising:

transverse structure filters;
ladder structure filters; and
trellis structure filters.

14. (Currently Amended)The method according to claim 12, characterized in that said biorthogonal multicarrier signal is comprises an orthogonal frequency division multiplex/offset modulation (OFDM/OM) signal.

15. (Currently Amended)A method for demodulating a biorthogonal frequency division multiplex/offset modulation (BFDM/OM) biorthogonal multicarrier signal characterized in that it implements a bank of analysis filters having $2M$ parallel branches, each comprising an expander of order M and filtering means, and delivering representative data received from source data, said filtering means being derived from a predetermined prototype modulation function.

16. (Currently Amended) Apparatus comprising:

a modulating device for modulating a biorthogonal frequency division multiplex/offset modulation (BFDM/OM) biorthogonal multicarrier signal, characterized by a bank of synthesis filters having $2M$ parallel branches, $M \geq 2$, each fed by source data and each comprising an expander of order M and filtering means, said filtering means being derived from a predetermined prototype modulation function.

17. (Previously Presented)The apparatus according to claim 16, wherein the modulating device is further characterized in that it implements a reverse Fourier transform fed by $2M$ source data, each having undergone a predetermined phase shift, and feeding $2M$ filtering modules, each following by an expander of order M , the outputs of which are grouped then transmitted.

18. (Previously Presented)The apparatus according to claim 16, further including a demodulation device for demodulating a BFDM/OM biorthogonal multicarrier signal characterized by:

a bank of analysis filters having $2M$ parallel branches, each comprising an expander of order M and filtering means, and delivering representative data received from source data, said filtering means being derived from a predetermined prototype modulation function.

19. (Previously Presented)The apparatus according to claim 20, wherein the demodulating device is further characterized in that it implements a reverse Fourier transform fed by $2M$ branches, themselves fed by said transmitted signal, and each comprising a decimator of order M followed by a filtering module, and feeding $2M$ phase shift multipliers, delivering an estimation of the source data.

20. (Currently Amended)A demodulation device for demodulation a biorthogonal frequency division multiplex/offset modulation (BFDM/OM) biorthogonal multicarrier signal characterized by:

a bank of analysis filters having $2M$ parallel branches, each comprising an expander of order M and filtering means, and delivering representative data received from source data, said filtering means being derived from a predetermined prototype modulation function.

21. (Previously Presented) The demodulation device according to claim 20, further characterized in that it implements a reverse Fourier transform fed by $2M$ branches, themselves fed by said transmitted signal, and each comprising a decimator of order M followed by a filtering module, and feeding $2M$ phase shift multipliers, delivering an estimation of the source data.